

What is claimed is:

1. An in vivo small animal image analysis process for automatic evaluation of at least one of two-dimensional and three-dimensional images of small animals, the images including at least one of one-dimensional, two-dimensional and three-dimensional image data, the process comprising:
  - a) preparing the small animal;
  - b) recording at least one of two-dimensional and three-dimensional images of the small animal via an imaging examination device;
  - c) reading the at least one of two-dimensional and three-dimensional image data for the small animal;
  - d) segmenting the image data, based upon image data characteristics, into segments, wherein the image data characteristics represent areas of interest for the small animal;
  - e) formatting cohesive areas by associating the segments on the basis of association criteria, wherein the cohesive areas are filtered by masking out remaining image data not associated with the cohesive areas;
  - f) filtering the cohesive areas, when appropriate, and analyzing the cohesive areas based upon analysis criteria;
  - g) storing at least one of the analyzed area data and segment data in a data memory; and
  - h) repeating steps a) to g) for the same small animal at time intervals.
2. The image analysis process as claimed in claim 1, further comprising:
  - i) quantifying at least one of the analyzed area data and segment data;
  - j) comparing at least one of the quantified area data and segment data with at least one of stored area data and segment data from at least one previous analysis process;
  - k) at least one of measuring and detecting a change in at least one of the segments and the cohesive areas; and
  - l) storing results in a databank.
3. The image analysis process as claimed in claim 1, wherein the segmenting

of the image data is carried out based upon the watershed algorithm, by at least one of region growing and conversion to binary form.

4. The image analysis process as claimed in claim 1, wherein the image data, before carrying out the step a), is determined by at least one of optical fluorescence, magnetic resonance, computer tomography and nuclear medical processes.

5. The image analysis process as claimed in claim 1, wherein run length encoding is used as the association criterion for the associating of the segments in order to form cohesive areas, and wherein the cohesive areas are then post-processed.

6. The image analysis process as claimed in claim 1, wherein at least one of a centroid, a size, a mass and at least one substance concentration, at least one of obtained from the encoding of the image data and calculated from the image data, is used as the analysis criterion for analysis of the cohesive areas.

7. The image analysis process as claimed in claim 1, wherein the measured changes in at least one of the segments and in the cohesive areas are stored as a dynamic sequence observation of at least one of a tumor and some other debilitation.

8. The image analysis process as claimed in claim 1, wherein the process steps a) to h) are carried out and displayed automatically on the basis of a predetermined workflow.

9. An in vivo small animal imaging apparatus, comprising:  
means for preparation of a small animal;  
an imaging examination device for recording of at least one of two-dimensional and three-dimensional images of the small animal;  
means for reading the at least one of the two-dimensional and three-dimensional image data for the small animal;

means for segmenting the image data, based upon image data characteristics, into segments, wherein the image data characteristics represent areas of interest for the small animal;

means for forming cohesive areas by associating the segments on the basis of association criteria, wherein the cohesive areas are filtered by masking out the remaining image data which is not associated with the cohesive areas;

means for filtering the cohesive areas, if appropriate, and for analyzing the cohesive areas based upon analysis criteria;

means for storing at least one of the analyzed area data and segment data.

10. The apparatus as claimed in claim 9, wherein results are stored in an experimental databank, permitting long-term comparison of the measured analysis data.

11. The apparatus as claimed in claim 9, further comprising:

means for graphical comparison and indication of the measured changes in at least one of the segments and in the cohesive areas, in the dynamic sequence observation, in the analysis criteria and their results, and in the data from an experimental databank, and means for displaying on the basis of workflows.

12. The image analysis process as claimed in claim 1, wherein the image data characteristics are predetermined.

13. The image analysis process as claimed in claim 1, wherein the association criteria are predetermined.

14. The image analysis process as claimed in claim 12, wherein the association criteria are predetermined.

15. The image analysis process as claimed in claim 14, wherein the analysis criteria are predetermined.

16. The image analysis process as claimed in claim 1, wherein the analysis

criteria are predetermined.

17. The image analysis process as claimed in claim 2, wherein the segmenting of the image data is carried out based upon the watershed algorithm, by at least one of region growing and conversion to binary form.

18. The image analysis process as claimed in claim 1, wherein the measured changes are displayed.

19. The apparatus as claimed in claim 10, further comprising:  
means for graphical comparison and indication of the measured changes in at least one of the segments and in the cohesive areas, in the dynamic sequence observation, in the analysis criteria and their results, and in the data from the experimental databank, and means for displaying on the basis of workflows.

20. The apparatus as claimed in claim 9, wherein the image data characteristics are predetermined.

21. The apparatus as claimed in claim 9, wherein the association criteria are predetermined.

22. The apparatus as claimed in claim 20, wherein the association criteria are predetermined.

23. The apparatus as claimed in claim 22, wherein the analysis criteria are predetermined.

24. The apparatus as claimed in claim 9, wherein the analysis criteria are predetermined.

25. A process, comprising:  
recording a multi-dimensional image of a subject;  
segmenting image data of the image into segments, based upon image

data characteristics, wherein the image data characteristics represent areas of interest of the subject;

forming cohesive areas by associating the segments based upon association criteria, and by masking out remaining image data not associated with the cohesive areas;

filtering the cohesive areas, when appropriate, and analyzing the cohesive areas based upon analysis criteria; and

storing at least one of the analyzed area data and segment data in a data memory.

26. The process as claimed in claim 25, further comprising:  
repeating at least one of the steps at time intervals.
27. The process of claim 25, wherein the subject is an animal.
28. The process as claimed in claim 25, further comprising:  
quantifying at least one of the analyzed area data and segment data;  
comparing at least one of the quantified area data and segment data with at least one of stored area data and segment data from at least one previous analysis process;  
at least one of measuring and detecting a change in at least one of the segments and the cohesive areas; and  
storing results in a databank.
29. The process as claimed in claim 25, wherein the segmenting of the image data is carried out based upon the watershed algorithm, by at least one of region growing and conversion to binary form.
30. The process as claimed in claim 25, wherein the image data, before carrying out the step of recording, is determined by at least one of optical fluorescence, magnetic resonance, computer tomography and a nuclear medical process performed on the subject.

31. The process as claimed in claim 25, wherein run length encoding is used as the association criterion for the associating of the segments in order to form cohesive areas, and wherein the cohesive areas are then post-processed.
32. The process as claimed in claim 27, wherein the image data characteristics represent areas of interest for the animal.
33. An apparatus, comprising:
  - means for recording a multi-dimensional image of a subject;
  - means for segmenting image data of the image into segments, based upon image data characteristics, wherein the image data characteristics represent areas of interest of the subject;
  - means for forming cohesive areas by associating the segments based upon association criteria, and by masking out remaining image data not associated with the cohesive areas;
  - means for filtering the cohesive areas, when appropriate, and analyzing the cohesive areas based upon analysis criteria; and
  - means for storing at least one of the analyzed area data and segment data in a data memory.
34. The apparatus of claim 33, wherein the subject is an animal.
35. The apparatus as claimed in claim 33, further comprising:
  - means for quantifying at least one of the analyzed area data and segment data;
  - means for comparing at least one of the quantified area data and segment data with at least one of stored area data and segment data from at least one previous analysis process;
  - means for at least one of measuring and detecting a change in at least one of the segments and the cohesive areas; and
  - means for storing results in a databank.

36. The apparatus as claimed in claim 33, wherein the segmenting of the image data is carried out based upon the watershed algorithm, by at least one of region growing and conversion to binary form.

37. The apparatus as claimed in claim 33, wherein the image data, before carrying out the step of recording, is determined by at least one of optical fluorescence, magnetic resonance, computer tomography and a nuclear medical process performed on the subject.

38. The apparatus as claimed in claim 34, wherein the image data characteristics represent areas of interest for the animal.